

REMARKS

Claims 1-36 are now pending in the application. Claims 1-7, 11-15, 19-23, 27-31, and 35-36 stand rejected. The Examiner states that claims 8-10, 16-18, 24-26, and 32-34 are allowable. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

35 U.S.C. § 112

Claims 1-7, 11-15, 19-23, 27-31, and 35-36 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. These rejections are respectfully traversed.

The Examiner remarks that the Specification of the present Application indicates that “the present invention employs a heuristic method to achieve improved accuracy without the use of perceptual model 20” (paragraph [0041]), but fails to specifically and clearly define said “heuristic method”. However, Applicant’s originally filed Specification demonstrates various examples of use of the heuristic method to a degree sufficient to allow one skilled in the art to readily recognize and understand the heuristic method.

For example, in paragraph [0038], the I indices having the maximum magnitudes are selected and modified uniformly by 1. One skilled in the art will readily recognize this choice as heuristic because it may not be optimal perceptually where it does not go through the perceptual model. For example, the same watermark can be embedded by modifying one of the indices by 2 and I-2 of them by 1 and leaving one of them unmodified. There are many other possible ways to embed the watermark. The chosen way is the most natural one without going into details of the perceptual model. Also,

experiment shows that the chosen way gives acceptable output quality. Therefore this simple scheme is adhered to in Applicant's preferred embodiment.

Another place in the Specification that the heuristic method is demonstrated is in paragraph [0041]. For example, results were obtained with I_{min} set to 1; however, setting I_{min} to be 1 is a heuristic choice. In fact, it provides a tradeoff between error concealment capability and allowed distortion for watermarking. For example, one can increase I_{min} to decrease the error concealment capability but decrease the potential distortion due to watermarking.

Yet further, in paragraph [0026], the Specification describes $\hat{b}(0)$, $\hat{b}(1)$, $\hat{b}(2)$, $\hat{b}(3)$. This choice is another heuristic choice as many other combinations are possible. For example, one can also introduce extra $\hat{b}(4)=1/3(b[n-1,k]+2*b[n+1,k])$ and $\hat{b}(5)=1/3(2*b[n-1,k]+b[n+1,k])$. Note that one will also need to modify d accordingly in [0027], but this can be done. These changes, allowing a more accurate prediction, improve error concealment capability at the price of more embedding information, and thus more distortion due to watermarking.

As detailed above, one skilled in the art will readily recognize that the originally filed Specification demonstrates how one can use a heuristic method to improve accuracy without the perceptual model, and will readily intuit various alternative heuristic methods that that can be employed with a tradeoff in error concealment capability versus more embedding capacity.

Accordingly, Applicants respectfully request the Examiner reconsider and withdraw the rejection of claims 1-7, 11-15, 19-23, 27-31, and 35-36 under 35 U.S.C. § 112, first paragraph.

35 U.S.C. § 102

Claims 1, 5-6, 19, 23 and 35 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Araki (U.S. Pat. No. 6,725,192). This rejection is respectfully traversed.

Applicant's claimed rate-distortion control guides and helps 'inaudible' embedding of additional information for the 'error concealment' application. It is performed on an already compressed AAC audio stream when content is added/embedded into it. In contrast, Araki is for 'coding'; the rate-distortion control is done during compression steps to produce best quality coded (compressed) stream. As explained below, Araki does not enable Applicant's claimed invention because Araki uses the original perceptual model used to compress the audio stream, which is generally not available for watermarking.

Araki is generally directed toward an audio coding (compression) scheme to govern the rate-distortion optimization for coefficient quantization (one of the steps in compression). Like in AAC, the quantization step size is iteratively modified until both the rate is below the target bit rate and the distortion is below the maximum acceptable value obtained from the perceptual model. However, Araki does not teach that an heuristic model is used for perceptual control to determine the perceptually tolerable distortion limit for said audio packets. Rather, Araki uses the original perceptual model used to compress the original audio stream. Since this original perceptual model is usually not available when the time arrives to add watermark, Araki does not enable watermarking of a compressed audio stream.

In Applicants' error concealment scheme, a strategy similar to that described in Araki is employed when adding a watermark to a compressed AAC audio stream.

Significant differences include: 1) starting with a compressed audio stream instead of an original audio stream; 2) using a heuristic model for perceptual control, not the original perceptual model used to compressed the original audio stream, since the original perceptual model usually is not available when we try to add watermark on a compressed audio stream; 3) and embedding content info to the audio stream, instead of coding (compressing) the audio stream.

Each of the independent claims recites subject matter to the use of an heuristic model for perceptual control when embedding content into a compressed audio stream. Accordingly, Applicants respectfully request the Examiner reconsider and withdraw the rejection of the independent claims under 35 U.S.C. § 102(e), along with rejection on these grounds of all claims dependent therefrom.

REJECTION UNDER 35 U.S.C. § 103

Claims 2 and 20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Araki (U.S. Pat. No. 6,725,192) in view of Shepard (U.S. Pat. No. 5,943,347). This rejection is respectfully traversed.

For discussion of Araki, Applicants respectfully direct the Examiner's attention to remarks detailed above with respect to rejections under 35 U.S.C. § 102(e). Applicant further respectfully asserts that the Examiner does not rely on Shepard to teach the subject matter recited in the independent claims, especially as amended.

Accordingly, Applicant's respectfully request the Examiner reconsider and withdraw the rejection of claims 2 and 20 under 35 U.S.C. § 103(a) based on their dependence from allowable base claims.

Claim 7 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Araki (U.S. Pat. No. 6,725,192) further in view of Tian et al. (U.S. Pat. No. 6,714,683). This rejection is respectfully traversed.

For discussion of Araki, Applicants respectfully direct the Examiner's attention to remarks detailed above with respect to rejections under 35 U.S.C. § 102(e). Applicant further respectfully asserts that the Examiner does not rely on Tian et al. to teach the subject matter recited in the independent claims, especially as amended.

Accordingly, Applicant's respectfully request the Examiner reconsider and withdraw the rejection of claim 7 under 35 U.S.C. § 103(a) based on its dependence from an allowable base claim.

Claims 3 and 21 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Araki (U.S. Pat. No. 6,725,192) in view of Shepard (U.S. Pat. No. 5,943,347), and further in view of Tian et al. (U. S. Pat. No. 6,714,683). This rejection is respectfully traversed.

For discussion of Araki, Applicants respectfully direct the Examiner's attention to remarks detailed above with respect to rejections under 35 U.S.C. § 102(e). Applicant further respectfully asserts that the Examiner does not rely on Shepard or Tian et al. to teach the subject matter recited in the independent claims, especially as amended.

Accordingly, Applicant's respectfully request the Examiner reconsider and withdraw the rejection of claim 3 and 21 under 35 U.S.C. § 103(a) based on their dependence from allowable base claims.

Claims 4 and 22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Araki (U.S. Pat. No. 6,725,192) in view of Shepard (U.S. Pat. No. 5,943,347),

further in view of Tian et al. (U. S. Pat. No. 6,714,683), and further in view of Paik et al. (U.S. Pat. No. 5,233,629). This rejection is respectfully traversed.

For discussion of Araki, Applicants respectfully direct the Examiner's attention to remarks detailed above with respect to rejections under 35 U.S.C. 102(e). Applicant further respectfully asserts that the Examiner does not rely on Shepard, Tian et al., or Paik et al. to teach the subject matter recited in the independent claims, especially as amended.

Accordingly, Applicant's respectfully request the Examiner reconsider and withdraw the rejection of claim 4 and 22 under 35 U.S.C. § 103(a) based on their dependence from allowable base claims.

Claims 11-12, 15, 27-28, 31 and 36 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Shepard (U.S. Pat. No. 5,943,347) in view of Araki (U.S. Pat. No. 6,725,192). This rejection is respectfully traversed.

For discussion of Araki, Applicants respectfully direct the Examiner's attention to remarks detailed above with respect to rejections under 35 U.S.C. 102(e). Applicant further respectfully asserts that the Examiner does not rely on Shepard to teach the subject matter recited in the independent claims, especially as amended.

Accordingly, Applicant's respectfully request the Examiner reconsider and withdraw the rejection of independent claims 11, 27, and 36 under 35 U.S.C. § 103(a), along with rejection of all claims dependent therefrom.

Claims 13 and 29 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Shepard (U.S. Pat. No. 5,943,347) in view of Araki (U.S. Pat. No. 6,725,192), and

further in view of Tian et al. (U.S. Pat. No. 6,714,683). This rejection is respectfully traversed.

For discussion of Araki, Applicants respectfully direct the Examiner's attention to remarks detailed above with respect to rejections under 35 U.S.C. § 102(e). Applicant further respectfully asserts that the Examiner does not rely on Shepard or Tian et al. to teach the subject matter recited in the independent claims, especially as amended.

Accordingly, Applicant's respectfully request the Examiner reconsider and withdraw the rejection of claims 13 and 29 under 35 U.S.C. § 103(a), along with rejection of all claims dependent therefrom.

Claims 14 and 30 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Shepard (U.S. Pat. No. 5,943,347) in view of Araki (U.S. Pat. No. 6,725,192), further in view of Tian et al. (U.S. Pat. No. 6,714,683) and further in view of Paik et al. (U.S. Pat. No. 5,233,629). This rejection is respectfully traversed.

For discussion of Araki, Applicants respectfully direct the Examiner's attention to remarks detailed above with respect to rejections under 35 U.S.C. § 102(e). Applicant further respectfully asserts that the Examiner does not rely on Shepard or Tian et al. to teach the subject matter recited in the independent claims, especially as amended.

Accordingly, Applicant's respectfully request the Examiner reconsider and withdraw the rejection of claims 13 and 29 under 35 U.S.C. § 103(a), along with rejection of all claims dependent therefrom.

ALLOWABLE SUBJECT MATTER

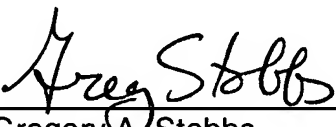
The Examiner states that claims 8-10, 16-18, 24-26, and 32-34 are allowable.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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